83694

S/076/60/034/008/008/014
B015/B054

5.4700

AUTHORS: Pilqyan, G. O., Yevseyev, A. M. and Gerasimov, Ya. I.
(Moscow)

TITLE: Thermodynamic Properties of Alloys of the System Chromium - Tantalum

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 8, pp. 1768-1772

TEXT: The authors determined the thermodynamic properties of chromium-tantalum alloys by measuring the pressure of chromium vapor with the use of the Knudsen effusion method. The measurements were made on eight samples at temperatures between 1228.5° and 1303.5°C; for calculating the activity of chromium, the authors measured vapor pressures at 1501.5° and 1576.5°K (Table 1), and therefrom determined the activity of chromium in the chromium-tantalum system (Table 2). They determined the integral formation heats and entropies of chromium-tantalum alloys by graphic integration from the Duhem-Margules equation (Table 3). The

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Thermodynamic Properties of Alloys of the System Chromium - Tantalum

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results obtained suggest the presence of a solid solution up to 7 atom% of Cr on the chromium side, and of a heterogeneous region and a solid solution on the basis of $TaCr_2$. On the tantalum side there is apparently a solid solution of chromium in tantalum up to 30 atom% of chromium. The maximum partial formation heat corresponds to the composition of the stoichiometric interphase $TaCr_2$. O. Kubashevskiy, G. B. Bokiy, and E. Ye. Vaynshteyn are mentioned in the paper. There are 3 figures, 3 tables, and 8 references: 3 Soviet and 5 US.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: November 15, 1958

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S/076/60/034/008/011/014
B015/B054

AUTHORS: Vasil'yeva, I. A., Gerasimov, Ya. I. and Simanov, Yu. P.
(Moscow)

TITLE: Thermodynamic Investigation of the Reduction Reaction of Tungsten Trioxide $WO_3(\alpha)$ With Hydrogen

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 8, pp. 1811-1815

TEXT: In continuation of a previous paper (Ref. 1), the authors investigated thermodynamically the reduction reaction of α-WO_3 (instead of β-WO_3) by hydrogen with the use of the circulation method at temperatures between 640° and 937°C. The X-ray investigation of the modification α-WO_3 produced for the experiments was carried out by the powder method, and a structure described by Magneli et al. (Ref. 3) was found. The investigations of the equilibrium α-$WO_3 + H_2$ showed that the reduction proceeds in four steps; below 212°C, a direct reduction to W is possible without the formation of the intermediate products

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$WO_{2.90}$, $WO_{2.72}$, and WO_2. From the measured equilibrium constants of the individual reduction stages (Table 1), the authors determined the equations $\log K_p = f(1/T)$ for each reaction step of α-WO_3 by the method of least squares. A comparison of the free energy for the complete reduction of α-WO_3 with that of β-WO_3 (Table 2) shows that the transition α-$WO_3 \longrightarrow \beta$-$WO_3$ takes place at a temperature of about 800°C. The dependence ΔZ_T^o on temperature is given in Table 3, the values ΔZ^o for the reaction $W + 3/2\ O_2 = \alpha$-WO_3 in Table 4. To calculate the thermodynamic quantities for α-WO_3, the authors used the method by M. I. Temkin and L. A. Shvartsman (Ref. 10), and obtained the following values: $\Delta H_{298}^o = -203.0$ kcal/mole, $\Delta Z_{298}^o = -184.7$ kcal/mole, $\Delta S_{298}^o = -61.6$ e.u., and $S_{298}^o = 20.0$ e.u. . A. V. Shashkina is mentioned in the paper. There are 1 figure, 4 tables, and 10 references: 4 Soviet and 6 US.

Thermodynamic Investigation of the Reduction Reaction of Tungsten Trioxide WO_3 (α) With Hydrogen

S/076/60/034/008/011/014
B015/B054

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: November 25, 1958

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84252

S/076/60/034/009/017/022
B015/B056

5.2610 also 2308

AUTHORS: Shapovalova, R. D., Mikhayleva, N. P., and Gerasimov, Ya. I.

TITLE: Some Physical Properties of Tungstates. II. Determination of the Densities of Tungstates

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 9, pp. 2060-2062

TEXT: For the purpose of studying some physical properties characterizing the interaction among the elements of the tungstate crystal lattice and for the purpose of finding an interrelation between the thermodynamic characteristics of the substance and its structure, the density as well as the magnetic and dielectric properties of some tungstates were investigated. In the present case, the results obtained by determining the density of the tungstates of Mg, Ca, Ba, Zn, Fe, Mn, Co, and Ni were given and explained. The determinations were carried out on a pycnometer (Fig. 1) with capillary tubes and a cut cap carbon tetrachloride (Table 1, specific gravity of carbon tetrachloride) being used as operating liquid. The measured values (Table 2) were compared with those calculated from

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Some Physical Properties of Tungstates. 1. Determination of the Densities of Tungstates S/076/60/034/009/017/022 B015/B056

radiographic data, and the essential difference was ascribed to lattice defects. Annealing (at 1000°C for 6-10 h) of some tungstates showed that in the course of annealing, the density of tungstates increased, whereas the X-ray picture of the sample did not change. This approach of the density to the density calculated from the radiographic data, due to annealing of the tungstate, is ascribed to the growth of the crystal grain and a reduction of cracks and vacancies in the crystal during annealing. There are 1 figure, 2 tables, and 1 Soviet reference.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet khim.cheskiy fakul'tet im. M. V. Lomonosova (Moscow State University, Chemical Department imeni M. V. Lomonosov)

SUBMITTED: December 31, 1958

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88260

S/076/60/034/012/015/027
B020/B067

5.4700

AUTHORS: Geyderikh, V. A., Vecher, A. A., and Gerasimov, Ya. I.

TITLE: Study of the Thermodynamic Properties of Binary Metal Systems by the Method of Electromotive Force. VI. The System Iron - Antimony in Solid State

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 12, pp. 2789-2794

TEXT: In publications usually the phase diagram for the system iron - antimony which is constructed from data of N. S. Kurnakov and N. P. Konstantinov [Abstracter's note: in the list of publications the name is spelled N. S. Konstantinov] (Ref. 1) is described. For temperatures below 620°C the phase diagram contains the following phases: 1) α-solid solution of antimony in iron; the limits of existence of the α-phase have not been accurately determined; 2) heterogeneous range (α- + ε -phases) with 3 to 42 atom% Sb; 3) ε -phase (42-48 atom% Sb), which in the following is referred to as $Fe_{0.52}Sb_{0.48}$; 4) heterogeneous range (ε-phase + $FeSb_2$)

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with 48 to 66.7 atom% Sb, and 5) heterogeneous range ($FeSb_2$ + Sb) with 66.7 to 100 atom% Sb. The authors studied the thermodynamic functions of the reaction taking place in the cell

$$Fe(sol) \mid Fe^{2+} \text{ in melt KCl + LiCl} \mid [Fe - Sb] \text{ sol. alloy} \quad (1)$$

which is based on the transfer of iron from the reference electrolyte (pure iron) to the electrode (iron-antimony alloy). When studying the temperature dependence of emf also the changes of the partial molar entropy and the heat content of the process can be determined. The measurements were made at temperatures of from 400 to 600°C for the alloys of the region $FeSb_2$ + Sb and at 500 to 700° for the alloys of the other regions of the phase diagram. The emf was measured by means of a potentiometer ПТВ-1 (PPTV-1) with a mirror galvanometer М-25-5 (M-25-5); the temperature was determined by a Pt -PtRh thermocouple with an accuracy of ± 1°C. A special thermostat kept the temperature constant at 1-2°C. Each experiment lasted 100 to 120, sometimes even 200 hours. The dependence of

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the partial and integral changes of the isobaric - isothermal potentials in the system Fe - Sb at 830°K are given in Figs. 2-4. The values ΔZ (integral change of the thermodynamic potential in the formation of 1 g atom of alloy from Fe and Sb), ΔS and ΔH of the formation of iron antimonides from Fe and Sb are given in Table 1. When determining the accuracy of the data obtained the authors used the maximum deviation of the experimentally obtained points from the calculated values without considering the strongly diverging results. The values of these deviations for all regions of the phase diagram are given in Table 2. N. V. Ageyev, Ye. S. Makarov, and K. Vagner are mentioned. There are 4 figures, 2 tables, and 14 references: 7 Soviet, 3 US, 1 French, and 3 German.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: March 28, 1959

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5(4)

AUTHORS: Nikol'skaya, A.V., Geyderikh, V.A., Gerasimov, Ya.I., Corresponding Member, AS USSR

S/020/60/130/05/033/061
B004/B014

TITLE: The Thermodynamic Properties of Indium Antimonide

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol 130, Nr 5, pp 1074-1077 (USSR)

ABSTRACT: In figure 1 the authors show the phase diagram of the In - Sb system and give a complete list of publications dealing with the thermodynamic properties of InSb. This paper is intended to calculate the thermodynamic properties of InSb on the basis of experimental data obtained by means of the electrochemical chain In(liquid) | (KCl-LiCl) + InCl | (InSb + Sb)(solid). The change ΔZ of the isobaric-isothermal potential is, as a result of the reaction In(liquid) + Sb(solid) = InSb(solid), proportional to the emf of the cell. Thus, the investigation of the temperature dependence of the emf also disclosed the temperature dependence of ΔZ. This investigation was therefore carried out in the heterogeneous region of the InSb - Sb system between 390° and 490° using alloys with an antimony content of 59.9%

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The Thermodynamic Properties of Indium Antimonide S/020/60/130/05/033/061
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and 67.2%. The authors describe the production of the alloys and InCl. The electric cell is shown in figure 2. Figure 3 contains experimental data. They follow the equation E = $= (0.3455 - 0.241.10^{-3}T)v$. Enthalpy and entropy of the reaction were calculated herefrom. A comparison of the data found with those obtained by other scientists is given in table 1. Within the limits of error, they agree with the data of reference 4. There are 3 figures, 1 table, and 10 references, 4 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova (Moscow State University imeni M.V. Lomonosov)

SUBMITTED: November 5, 1959

Card 2/2

LAVRENT'YEV, V.I.; GERASIMOV, Ya.I.; REZUKHINA, T.N.

Equilibrium with hydrogen and thermodynamic characteristics of $BaMoO_4$ and $BaMoO_3$. Dokl.AN SSSR 133 no.2:374-376 Jl '60. (MIRA 13:7)

1. Moskovskiy gosudarstvennyy universitet imeni M.V.Lomonosova.
2. Chlen-korrespondent AN SSSR (for Gerasimov).
(Barium molybdate)

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B004/B067

26.1512

AUTHORS: Alekseyev, N. V., Gerasimov, Ya. I., Corresponding Member of the AS USSR, and Yevseyev, A. M.

TITLE: Study of the Thermodynamical Properties of Liquid Indium - Bismuth Alloys

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 134, No. 3, pp. 618-620

TEXT: By measuring the emf the authors determined the thermodynamic functions of the In - Bi system in the range 240 - 300°C. Measurements were made on the concentration chain $In_{liqu} | In^+$ (in a melt of KCl, LiCl, $ZnCl_2$) $| (N_1In + N_2Bi)_{liqu}$. A mixture of 11 wt% KCl, 10 wt% LiCl, and 79 wt% $ZnCl_2$ with a melting point of approximately 220°C served as electrolyte. The emf was measured at 240, 260, 280, and 300°C. The function $E = f(T)$ was assumed to be linear. The activity of indium was calculated from the emf by equation $\log a_{In} = -zFE/4.576 \cdot T$, with indium

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being monovalent. The activity of bismuth was determined by graphical integration of the Gibbs-Duhem equation. Table 1 gives the activities of In and Bi; the thermodynamical values $\Delta\overline{H}$, $\Delta\overline{S}$ are listed in Table 2. Furthermore, the integral heats of mixing of the In - Bi system, obtained by the authors, are shown in Fig. 1. In Fig. 2 the In activity is compared with data by I. Terpilovsky (Ref. 1) and F. Wittig, E. Miller (Ref. 2). According to the data obtained by the authors, ΔH has a range of positive and a range of negative values. The values of the deviation from ideality, which are very negative at 450°C, decrease with decreasing temperature, and at 270°C they become positive. The authors explain this phenomenon as being a variation in the short-range order with a change in concentration and temperature. There are 2 figures, 2 tables, and 2 non-Soviet references.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: May 25, 1960

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84672

S/020/60/134/006/015/031
B016/B067

5.4700 2209, B60, 1018 only

AUTHORS: Gerasimov, Ya. I., Corresponding Member AS USSR, Vasil'yeva, I. A., Chusova, T. P., Geyderikh, V. A., and Timofeyeva, M. A.

TITLE: Study of the Thermodynamics of Lower Oxides of Tungsten by the Method of Electromotive Force at High Temperatures

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 134, No. 6, pp. 1350-1352

TEXT: The authors point to the shortcomings in determining thermodynamic functions of the formation of tungsten oxides, and they suggest that another method be used irrespective of the values for water vapor. They chose the method of electromotive force (emf) (Refs. 3-6) which they modified to some degree. The authors carried out their experiments in the vacuum in a special metal cell which was insulated with molten quartz. The solid solution 0.85 ZrO_2 + 0.15 CaO served as electrolyte with anionic conductivity. The authors measured the emf of the cells of

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the type WO_x | ZrO_2CaO | $Fe_{0.95}O$. Fe between 900 and 1230°K, with x = 2.719 (1); 2.66 (2); 2.39 (3); 1.90 (4); 1.69 (5), and 1.45 (6). The oxides of the mentioned composition were produced by reducing the low-temperature modification of WO_3-α (Ref. 2) by means of hydrogen. The first three compositions correspond to a mixture of the phases $WO_{2.72}$ and WO_2, the latter to the mixture WO_2 and W. The mixture $Fe_{0.95}O$ + Fe served as standard electrode. The experimental values of emf of the cells 1. - 3. and 4. - 6. are described by equation (1) and (2), respectively. The combination of the ΔG of the cells (1,2) which were calculated on the basis of a known equation with the ΔG of the formation of $Fe_{0.95}O$ from the elements (data by W. Lange, Ref. 7) yields the following equation for the reaction $1/2\,W + 1/2\,O_2 = 1/2\,WO_2$ (I).

$$\Delta G_1 = -68542 - 7.21\,T \log T + 1.26 \cdot 10^{-3}T^2 - 0.47 \cdot 10^{5}T^{-1} + 40.62T$$

(943 - 1230°K).

The values of ΔG_1 between 973 and 1273°K calculated on the basis of this

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equation, as well as the values ΔG_1 for the reaction (I) for these temperatures which the authors obtained earlier from the equilibrium data (Ref. 2) are shown in Table 1. An equation (II) is introduced for the ΔG_2 of the reaction $100/72\ WO_2 + 1/2\ O_2 = 100/72\ WO_{2.72}$ (900 - 1173°K). The ΔG_2 values between 923 and 1173°K calculated therefrom are given in Table 2. A combination of reaction (I) and/or (II) gives a further equation for the reaction $W + 1.36\ O_2 = WO_{2.72}$ (III). To calculate the standard thermodynamical values, the authors used the thermal capacities of O_2 and of W (Ref. 8), while for WO_2 they used equation $c_p = 17.83 + 1.89 \cdot 10^{-3} T - 3.342 \cdot 10^{5} T^{-2}$. The latter was derived on the basis of the value $c_{p\ 298}$ for WO_2 (Ref. 9), of the c_p values for solids at the conversion temperature and the average values for oxides UO_2, VO_2, and ThO_2. Using these values for the reaction $W + O_2 = WO_2$ (IV),

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Study of the Thermodynamics of Lower Oxides of Tungsten by the Method of Electromotive Force at High Temperatures

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the authors obtain the equation for ΔG_T:

$\Delta G_T = -136.6 - T(4.66M_0 + 0.21M_1 - 2.44M_{-2}) + 41.7T$. ($M_0$, M_1, M_{-2} are the coefficients of the equation of M. I. Temkin-L. A. Shvartsman, Ref. 12). It follows therefrom: $\Delta H^o_{298} = -136.6 \pm 2$ kcal; $\Delta S^o_{298} = -41.7 \pm 1.5$ e.u.; $\Delta G^o_{298} = -124 \pm 2$ kcal. By using the value of S^o_{298} for W the authors obtain: $S^o_{298} = 15.0 \pm 1.5$ e.u. For the purpose of comparison Table 3 shows some publication data for the thermodynamic functions of the formation of WO_2 from elements under standard conditions.

There are 3 tables and 17 references: 5 Soviet, 7 US, 2 French, and 3 German.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: June 3, 1960

Card 4/4

GERASIMOV, Ya. I.

Report to be submitted for the IUPAC 21st Conference and 18th Intl. Congress of Pure and Applied Chemistry, Montreal, Canada, 2-12 August 1961

GORODYSKIY, A. V., Academy of Sciences UkSSR, Kiev - "The oscillographic investigation of the electrochemical kinetics in fused salts" (Section A.3,e.2 - Session I, 11 Aug 61, afternoon)
GURVICH, L. V., Academy of Sciences USSR, Moscow - "The calculation of thermodynamic functions of gases in a wide temperature range" (Section A.3,c,(1), Session II - 8 Aug 61, afternoon)
KARGIN, V. A., Physico-Chemical Institute imeni L. Ya. Karpov, Moscow - "Vitrification phenomena in crystalline polymers" (Section B.4 - 7 Aug 61, afternoon)
KISELEV, A. V., Moscow State University imeni M. V. Lomonosov - "The influence of surface heterogeneity and adsorbate-adsorbate interaction on the adsorption properties of solid surfaces" (Joint Session, Sections A.2 and B.1 - 8 Aug 61, morning)
KONDRAT'YEV, V. N., Institute of Chemical Physics, Academy of Sciences USSR, Moscow - "The HO_2 radical" (Section A.1, Session I - 11 Aug 61, morning) (Also, Section A.1, Chairman, Session I - 8 Aug 61, morning)
KUZNETSOV, V. I., Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, Academy of Sciences USSR - "A novelty in the use of organic coprecipitants for concentration of small amounts of the elements" (To be presented in Russian) (Section C.2 - 11 Aug 61, morning)
LAVRUKHINA, A. K., SAMOVSKIY, E. E., and MOSKALEVA, L. P., Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, Academy of Sciences USSR - "New data on radiochemical investigations of the processes of fission and fragmentation induced by high energy protons" (Section A.4 - 8 Aug 61, afternoon)
LOVACHEV, L. A., Academy of Sciences USSR, Moscow - "Determination of rate constants of elementary processes from flame velocities as a function of temperature, pressure, and molecular transfer coefficients" (Section A.3,b,(2) - 7 Aug 61, afternoon)
MENDIATH, S. (Probably MUNDYATH, S.) and GERASIMOV, Ya. I., Moscow State University imeni M. V. Lomonosov - "Study of the thermodynamic properties of the system iron-latimer" (Section A.3,c,(3), Session II(A) - 11 Aug 61, morning)
PANCHENKOV, G. M., BOLOTIN, A. M., MALAKOV, V. P., and SHEYEN, Ya., Moscow State University imeni M. V. Lomonosov - "Emission of complex ions in solid-phase reactions" (Joint Session, Sections A.2 and B.1, 8 Aug 61, morning)
SEMENOV, N. N., Institute of Chemical Physics, Academy of Sciences USSR, Moscow - "Certain chemical reactions at reduced temperatures and related problems of energy transfer" (To be presented in Russian) (Plenary lecture - Saturday, 12 Aug 61)
SHILOV, Ye. A., Academy of Sciences UkSSR, Kiev - "The active agents and the intermediary complexes in the heterolytic reactions of halogenation of the organic compounds" (Section A.1, Session II - 11 Aug 61, morning)
SMIRNOV, M. V., Electrochemistry Institute, Sverdlovsk - "The equilibrium between the titanium subgroup metals and the salt melts" (Section B.3 - 7 Aug 61, afternoon)
TAL'ROZE, V. L., Institute of Chemical Physics, Academy of Sciences USSR - "Reactions of ions and molecules in the gas phase" (Section A.1, Session I - 9 Aug 61, afternoon)
TERENIN, Aleksandr N., Leningrad State University imeni A. A. Zhdanov - (Section A.1, Chairman, Session I - 8 Aug 61, afternoon Session) (Also on program for Section A.1, Session I - 9 Aug 61, afternoon)
TERENIN, Aleksandr N., VILESOV, F. I., KURBATOV, B., and DODONOVA, N., Leningrad State University imeni A. A. Zhdanov - "Mass-spectrometry and luminescence of radicals in the photodissociation and photoionization of molecules by vacuum ultra-violet radiation" (Section A.1, Session I - 9 Aug 61 - afternoon)
TUNITSKIY, N. N., Scientific Research Physico-Chemical Institute imeni L. Ya. Karpov - "On the dissociation of molecules on electron impact and the early states of radiation-chemical processes" (Section A.1, Session I - 8 Aug 61, afternoon)
YANISHEVSKIY, Emmanuil Ye., and KOROLEV, V. V., Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, Moscow - "The plasma generator and its use for spectral analysis of alloys and rocks" (Section C.1 - 8 Aug 61, morning)
VINOGRADOV, A. P., LAVRUKHINA, A. K., and REVINA, L. D., Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, Academy of Sciences USSR - "The study of nuclear reactions in iron meteorites under the action of high energy protons" (Section A.4 - 8 Aug 61, afternoon)
YAKOVLEV, Yu. V., and ALIMARIN, I. P., Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, Academy of Sciences USSR - "The determination of trace impurities in some materials for semiconductor techniques by radio-activation analysis" (To be presented in Russian) (Section C.1 - 8 Aug 61, afternoon)

YEROFEYEV, Boris V., Institute of Physical-Organic Chemistry, Minsk - "The effect of donor and acceptor admixtures on the decomposition rate of solids" (Section A.2 - 8 Aug 61, afternoon)

report to be submitted for the IUPAC 21st Conference and 18th Intl. Congress of Pure and Applied Chemistry, Montreal, Canada, 2-12 August 1961

ALIMARIN, I. P., and ZOLOTOV, Yu. A., Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, Academy of Sciences USSR - "Extraction of metal chelate compounds as affected by the nature of the solvent" (To be presented in Russian) (Section C.2 - 11 Aug 61, morning)

BAGDASAR'YAN, Kh. S., and KROKHAUZ, V. A., Scientific Research Physico-Chemical Institute imeni L. Ya. Karpov, Moscow - "Some aspects of energy transfer in radiation chemistry" (Section A.2, Session II - 7 Aug 61, morning)

DELIMARSKIY, Yu. K., Institute of General and Inorganic Chemistry, Academy of Sciences UkrSSR, Kiev - "The kinetics of the electrode processes in the electrolysis of melted salts" (Section B.3 - 10 Aug 61, morning)

DELIMARSKIY, Yu. K., ANDREYA, V. N., BOYKA, K. M. (Possibly VOYKA, K. M.), NABARENKO, G. D., and KAPSOVA, T. N., Institute of General and Inorganic Chemistry, Academy of Sciences UkrSSR, Kiev - "Electrochemical experiment with melted borate and phosphate" (Section A.1, c, (2), Session I - 11 Aug 61, morning)

DELIMARSKIY, Yu. K., [illegible], I. D., and SHILINA, G. V., Institute of General and Inorganic Chemistry, Academy of Sciences UkrSSR, Kiev - "On the [illegible] diffusion in melted salts" (Section B.3 - 9 Aug 61, afternoon)

GERASIMOV, Ya. I., Moscow State University imeni M. V. Lomonosov, (Co-Chairman, Section A.3,c,(2), Session I(B), 11 Aug 61, afternoon)

GERASIMOV, Ya. I., LAVRENT'YEV, V. I., KUZNETSOV, F. A., and REZUKHINA, T. N., Moscow State University imeni M. V. Lomonosov - "The thermodynamic properties of columbium and cerium oxides" (Section A.3,c,(3), Session II(A), 11 Aug 61, morning)

GOL'DANSKIY, V. I., Institute of Chemical Physics, Academy of Sciences USSR - "Two-proton radioactivity - a new kind of radioactive decay of nuclei" (Section A.4 - 7 Aug 61, morning)

GERASIMOV, Ya. I.

"The thermodynamic properties of binary metallic alloys studied through changes in enthalpy, entropy, and isobaric potential in the formation of solid a alloys from pure (solid or liquid) metals."

report submitted at the General Conference of the Division of Chemical Sciences of the Academy of Sciences, USSR, 27-28 October 1960

So: Izvestiya Akademii nauk SSSR, otdeleniye khimicheskikh nauk, No. w2 1961, Moscow, pages 378-380

GERASIMOV, Yakov Ivanovich; KRESTOVNIKOV, Aleksandr Nikolayevich; SHAKHOV, Aleksey Sergeyevich. Prinimali uchastiye: DUDAREVA, A.G., assistent; LOMOV, A.L., assistent; FEYGINA, Ye.I., assistent; VYGODSKIY, I.A., inzh.; KUZNETSOV, F.A., aspirant; LAVRENT'YEV, V.I., aspirant; CHERNOV, A.N., red.; KAMAYEVA, O.M., red. izd-va; MIKHAYLOVA, V.V., tekhn. red.

[Chemical thermodynamics in nonferrous metallurgy] Khimicheskaia termodinamika v tsvetnoi metallurgii. Moskva, Gos. nauchno-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii. Vol.2. [Thermodynamics of copper, lead, tin, silver and their most important compounds; a handbook] Termodinamika medi, svintsa, olova, serebra i ikh vazhneishikh soedinenii; spravochnoe rukovodstvo. 1961. 262 p.
(MIRA 14:11)

(Nonferrous metals—Thermal properties)
(Chemistry, Metallurgic)

30949
S/576/61/000/000/003/020
E073/E535

26.2421

AUTHORS: Gerasimov, Ya.I. and Nikol'skaya, A.V.

TITLE: Thermodynamic properties of tellurides of bismuth (Bi_2Te_3) and antimony (Sb_2Te_3)

SOURCE: Soveshchaniye po poluprovodnikovym materialam, 4th. Voprosy metallurgii i fiziki poluprovodnikov; poluprovodnikovyye soyedineniya i tverdyye splavy. Trudy soveshchaniya. Moscow, Izd-vo AN SSSR, 1961. Akademiya nauk SSSR. Institut metallurgii imeni A. A. Baykova. Fiziko-tekhnicheskiy institut. 30-33

TEXT: Information published in the literature does not contain data on the energy and the free energy of formation of the Bi_2Te_3 and Sb_2Te_3 phases. The authors of this paper studied the thermodynamic properties of tellurides of bismuth and antimony by measuring the e.m.f. of galvanic cells of the type $-M(Bi,Sb)|(KCl - LiCl) + BiCl_3, SbCl_3|(M_2Te_3 + Te)^+$. One of the electrodes was a pure metal, the other was the telluride under investigation with an excess of free tellurium. Both electrodes

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E073/E535

were submerged into a salt melt consisting of a mixture of chlorides of potassium and lithium (eutectic composition, t_{fus} = 352°C) to which small quantities of $BiCl_3$ and $SbCl_3$ were added. The bismuth telluride was investigated in the temperature range 370 to 410°C, the antimony telluride in the temperature range 380 to 420°C. Altogether three Bi_2Te_3 alloys (two containing 74.3 at.% Te and one containing 66.05 at.% Te) and five Sb_2Te_3 alloys (containing 63.95, 68.9, 73.15, 73.7, 74.1 at.% Te) were studied. The alloys were produced by fusing appropriate quantities of the metals in evacuated quartz ampoules at temperatures of 650 to 700°C. Following that, the melts were cooled to 400°C and maintained at that temperature for a long time. From these alloys, electrodes were produced. The measured e.m.f. showed a linear dependence on the temperature. The results were evaluated by the method of average values for Bi_2Te_3 and by the method of least squares for Sb_2Te_3. The following values were obtained: for Bi_2Te_3 $E = (0.1767 - 6.04 \cdot 10^{-5} T)$ V; for Sb_2Te_3 $E = (0.1033 + 4.95 \cdot 10^{-6} T)$ V. On the basis of ordinary thermodynamic relations, the isobaric

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formation potentials at 400°C, the values of the enthalpy and entropy of formation of the studied phases were calculated. These were as follows:

Phase	Reaction	ΔZ, kcal/g-atom	ΔH, kcal	ΔS, kal/g-at-deg
Bi_2Te_3	0.4 Bi(liquid) + 0.6 Te(solid) = $Bi_{0.4}Te_{0.6}$	-3.76 ± 0.01 kcal	-4.88 ± 0.2 kcal	-1.67 ± 0.3 kcal/deg
Sb_2Te_3	0.4 Sb(solid) + 0.6 Te(solid) = $Sb_{0.4}Te_{0.6}$	-2.95 ± 0.1 kcal	-2.86 ± 0.5 kcal	+0.14

The values for Bi_2Te_3 were obtained for the first time. For Sb_2Te_3 the heat of formation determined from e.m.f. data was 14.3 ± 2.5 as compared to the value 28 ± 4 kcal/g mol given by

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Thermodynamic properties of ... S/576/61/000/000/003/020
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O. Kubashevskiy and E. Evans (Ref.6: Thermo-chemistry in metallurgy. Russian translation. Moscow. 1954. p.284). There are 2 figures, 1 table and 6 references all Soviet.

Card 4/4

ANIKIN, A.G.; GERASIMOV, Ya.I.; GORDEYEV, I.V.

Absorption of high-frequency radiation (6 and 11 Mc) in aqueous and alcohol (methanol) solutions of alkali metal chlorides. Vest. Mosk. un. Ser. 2: Khim. 16 no.1:42-47 Ja-F '61. (MIRA 14:4)

1. Laboratoriya khimicheskoy termodinamiki Moskovskogo universiteta.
(Alkali metal chlorides)

S/076/61/035/001/022/022
B004/B060

AUTHORS: Gerasimov, Ya. I., Kholler, V. A., Khomchenko, G. P.

TITLE: Konstantin Grigor'yevich Khomyakov (on his 70th birthday)

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 1, 1961, 228-229

TEXT: This is an article written on the occasion of the 70th birthday of K. G. Khomyakov, Professor, Doctor of Chemistry, on January 1, 1961. Khomyakov's scientific activity has always been connected with the Moskovskiy gosudarstvennyy universitet (Moscow State University). In 1915, when still a student, he collaborated with V. V. Razumovskiy on problems of defense. In the following year he worked as a chemist at the factory, in which the results of those studies were put into practice. After the revolution, the terrain of that factory was used for the construction of the first Scientific Research Institute of Applied Chemistry, at whose central laboratory Khomyakov worked for 12 years. In 1917, Khomyakov graduated from the khimicheskoye otdeleniye fiziko-matematicheskogo fakul'teta MGU (Chemical Department of the Division of Physics and Mathematics of Moscow State University), and, on a suggestion by

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Konstantin Grigor'yevich Khomyakov ... S/076/61/035/001/022/022
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Professor I. A. Kablukov remained at the University, where he worked at the thermokhimicheskaya laboratoriya im. V. F. Luginina (Thermochemical Laboratory imeni V. F. Luginin). In 1919, on Professor M. M. Popov's advice, he started with lectures of chemistry at the Rabochiy fakul'tet (Workers' Division) of the Moscow State University. As of 1930, he became concerned with industrial problems, e.g., when commissioned by the Institut udobreniy (Institute of Fertilizers) in collaboration with M. M. Popov, P. K. Shirokikh, N. N. Fedos'yev, and S. F. Yavorskaya on phosphates, and also on the catalytic synthesis of Synthol. He was awarded the D. I. Mendeleyev Prize for this activity. In 1934, Professor Khomyakov began with the study of the kinetics of dissociation of carbonates and the dehydration of crystal hydrates. This study was the basis on which he built his dissertation for a doctor's degree "Study of the transformation of solid phases under formation of a new solid phase and of gas". As from 1943, Khomyakov has been supervising the kafedra obshchey khimii (Department of General Chemistry) of the Chemical Division of Moscow State University. Under his guidance, studies were conducted (using calorimetric methods of continuous adiabatic electric heating) on transformations in metal and salt systems in the solid state (with V. A. Kholler, M. Ye. Levina,

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V. A. Troshkina), on synthesis of zin phosphide (with N. V. Karvyalis), on the kinetics of the decomposition of molybdenum and tungsten peroxides (with G. V. Kosmodem'yanskaya), as well as (with I. A. Zaydenman) on the primary phase of the formation of Synthol from CO and H_2; furthermore, studies of the magnetic alloys Fe-Ni-Al and Fe-Co-Al (with V. A. Troshkina and Yu. D. Tret'yakov). Starting in 1956, Khomyakov has been conducting studies on the chemistry and the physics of ferrites. Mention is made of the study of multicomponent systems of salts of the schoenite type (with M. I. Ozerova and Yu. D. Tret'yakov), the specific heat of ferrites (with L. A. Reznitskiy), the valence states of cations in ferrites (with V. A. Kholler and A. I. Pavlova-Verevkina). Khomyakov is at present holding lectures on physicochemical analyses. The first volume of his book "Lektsii po obshchey khimii" (Lectures on General Chemistry) was published in 1957, and the second volume has now gone to the press. Khomyakov has been decorated with the Lenin Order. There is 1 figure.

VECHER, A.A.; GEYDERIKH, V.A.; GERASIMOV, Ya.I.

Electromotive force study of the thermodynamic properties of binary metallic systems. Part 7: Iron-antimony liquid alloys. Zhur. fiz. khim. 35 no.7:1578-1585 Jl '61.
(MIRA 14:7)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova.
(Iron—Antimony alloys) (Electromotive force)

ZHARKOVA, L.A.; GERASIMOV, Ya.I. (Moscow)

Approximate calculation of the thermodynamic characteristics of divalent metal tungstates and molybdates. Zhur.fiz.khim. 35 no.10:2291-2296 O '61. (MIRA 14:11)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.
(Tungstates) (Molybdates)

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B101/B138

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AUTHORS: Shapovalova, R. D., Belova, V. I., Zalesskiy, A. V., and Gerasimov, Ya. I.

TITLE: Some physical properties of tungstates. III. Magnetic properties of tungstates

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 12, 1961, 2713 - 2716

TEXT: The authors studied the magnetic properties of 12 tungstates (Table 1). Magnetic susceptibility, χ, was determined by the Gouy Sucksmith method. The absence of ferromagnetic impurities was indicated by the fact that χ was independent of field strength. Table 1 shows the χ values obtained at 293°K. On the basis of these data, the diamagnetic susceptibility of the WO_4^{2-} ion was calculated to be $-(28.4 \pm 1.9)\cdot 10^{-6}$ which is in good agreement with published data. For paramagnetic tungstates, the temperature dependence of χ was studied at 290 - 700°K and field strengths between 4500 and 7600 oersteds. All substances followed

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the Curie-Weiss law. θ and C of the Curie-Weiss equation $\chi = C/(T - \theta)$ were determined graphically. The authors found: $MnWO_4$: θ = -53.6, C = 0.01233; $FeWO_4$: θ = +42.0, C = 0.01031; $CoWO_4$: θ = +9.57, C = 0.00963; $NiWO_4$: θ = -66.1, C = 0.00407; $CuWO_4$: θ = +18.0, C = 0.00086. Table 4 gives the magnetic moments calculated according to Gouy (1) and Sucksmith (2), and the theoretical moment for Me^{2+}. There are 1 figure, 4 tables, and 6 non-Soviet references. The three references to English-language publications read as follows: Mata Prasad, C. R. Kanekar, G. Scient. and Industr. Res., 11A, 183, 1952; Venkateswarlu, Ramanathan, Current Sci., 24, 83, 1955; R. S. Nyholm, Quart. Rev., I, 377, 1953.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: March 24, 1960

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S/020/61/136/006/018/024
B101/B203

AUTHORS: Lavrent'yev, V. I., Gerasimov, Ya. I., Corresponding Member AS USSR, and Rezukhina, T. N.

TITLE: Thermodynamic characteristics of niobium oxides (equilibrium with hydrogen, and electrochemical measurements)

PERIODICAL: Doklady Akademii nauk SSSR, v. 136, no. 6, 1961, 1372-1375

TEXT: As published data concerning the reduction of niobium oxides are insufficient, and the equilibrium of low niobium oxides with hydrogen has not yet beeen studied at all, the authors report on the reduction of Nb_2O_5 in equilibrium with H_2 to NbO, as well as on the measurement of emf of a galvanic cell of NbO and metallic niobium. The equilibrium of niobium oxides with hydrogen between 1200 and 1550°C was studied in a circulation apparatus described in Ref. 8. The samples were placed in a molybdenum furnace on a platinum base in such a manner that they touched the Pt in a few places only, and were reduced in a hydrogen flow. The total composition of the reaction products was determined from the

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Thermodynamic characteristics of niobium...

increase in weight of the sample on annealing in air, the phase composition by means of X-rays. Two stages of reduction of Nb_2O_5 were ascertained: $2.5NbO_{2.4}+H_2 \longrightarrow 2.5NbO_2+H_2O$ (I), and $NbO_2+H_2 \longrightarrow NbO+H_2O$ (II). Fig. 1 shows the logarithms of the equilibrium constant $K_p = P_{H_2O}/P_{H_2}$ as a function of composition. Between $NbO_{2.4}$ and $NbO_{2.5}$, K_p changes so quickly that it could not be measured accurately. For the polytherms of the equilibrium constant of the two stages, the authors found the equations: $\log K_{p_I} = -15050/4.575T+1.3306$ (1480-1673°K); $\log K_{p_{II}} = -29490/4.575T+1.3334$ (1673-1823°K), and obtained therefrom: $\Delta G^o_I(cal) = 15050-6.087T$; $\Delta G^o_{II}(cal) = 29490-6.10T$. By combination of reactions I and II with $H_2+(0.5)O \longrightarrow H_2O_{gas}$ (III), and with the use of J. Chipman's data (Ref. 9) and the specific heat for NbO_2 and NbO (Ref. 10) as well as for O_2 (Ref. 11), they found for the reaction

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Thermodynamic characteristics of niobium...

$2NbO_2+0.5O_2 \longrightarrow Nb_2O_5$ (VI): $\Delta G^o_{VI} = -65.5$ kcal; $\Delta H^o_{VI} = -70.25$ kcal; $\Delta S^o_{VI} = -15.91$ entropy units (referred to 298.2°K). It was not possible to conduct the reduction to the metal under equilibrium conditions. Therefore, the thermodynamic functions of NbO were determined by measuring the emf E of the cells $Pt|Fe,Fe_{0.95}O|$ solid electrolyte $|NbO,Nb|Pt$ (A), and $Pt|Fe_3O_4,Fe_{0.95}O|$ solid electrolyte $|Fe_{0.95}O,Fe|Pt$ (B) between 841 and 1073°C. Mixed crystals of the system $ThO_2 - La_2O_3$ were used as solid electrolyte. Values in good agreement with published data were obtained for cell B. For cell A, results are given in Fig. 3. The maximum error does not exceed 1.2%. For the reaction $Fe_{0.95}O+Nb \longrightarrow 0.95Fe+NbO$ (VII), the authors calculated: $\Delta G^o_{VII} = -34500+3.15T$; for the reaction $Nb+0.5O_2 \longrightarrow NbO$ (VIII): $\Delta G^o_{VIII} = -92.36$ kcal; $\Delta H^o_{VIII} = -98.39$ kcal; $\Delta S^o_{VIII} = -20.19$ entr.un. By combination of the reactions $NbO+0.5O_2 \longrightarrow NbO_2$ (V), as well as VI and VIII, they calculated for

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Thermodynamic characteristics of niobium...

$2Nb+(5/2)O_2 \rightarrow Nb_2O_5$ (IX): (at 298.2°K) ΔH°_{IX} = -456.9 kcal; ΔG°_{IX} = -424.9 kcal; ΔS°_{IX} = -107.43 e.u., and for the reaction $Nb+O_2 \rightarrow NbO_2$ (X): ΔH°_X = -193.3 kcal; ΔG°_X = -179.7 kcal; ΔS°_X = -45.76 entr.units. There are 3 figures, 2 tables, and 23 references: 8 Soviet-bloc and 10 non-Soviet-bloc.

SUBMITTED: November 30, 1960

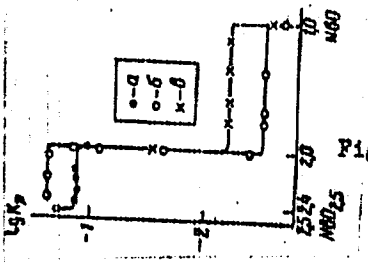

Fig. 1

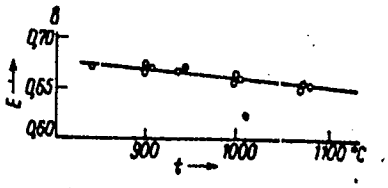

Fig. 3

Fig. 3

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S/020/61/137/006/016/020
B101/B201

AUTHORS: Geyderikh, V. A., Gerasimov, Ya. I., Corresponding Member AS USSR, and Nikol'skaya, A. V.

TITLE: Thermodynamic properties of alloys of the iron - tellurium system in the solid state

PERIODICAL: Doklady Akademii nauk SSSR, v. 137, no. 6, 1961, 1399-1401

TEXT: A study has been made of solid Fe-Te alloys by measuring the emf E of the chain (-)Fe|$\underset{\text{melt}}{FeCl_2(KCl + LiCl)}$|Fe - Te (+) (1). 21 alloys in the phase region solid alloy region β + Te, β, β + γ, γ, γ + α, and β + α, have been examined at 360-650°C. Alloy production and methods are described in Ref. 1 (DAN, 130, 1074, (1960)). The linear equations E = A + BT (Table 1) have been calculated by the method of the least squares. The calculated course of the thermodynamic functions is shown in Fig. 2. Results: 1) The formation entropies from the elements of α- and γ-phase are positive. 2) The β-phase arises with diminution of entropy. 3) The formation enthalpies, while having a course parallel to the entropies, remain negative in the whole concentra-

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tion range. 4) A similar course has also been found in the Fe - Sb system. The relationship is explained by the fact that the β-phase of the Fe - Te system inclusive of $FeTe_2$ has a marcasite structure like $FeSb_2$. The γ-phase of the Fe - Te system and the ε-phase of the Fe - Sb system are berthollide phases with defective structure of the type of nickel arsenide. Their range of existence no longer comprises the composition 1 : 1. 5) In accordance with the authors' view concerning the effect of lattice defects in NiAs upon the formation entropy of the intermetallic phase, the range of existence of the γ-phase of the Fe - Te system is more distant from the 1 : 1 composition, than the ε-phase of the Fe - Sb system. 6) In all Fe - Te alloys with the composition N_{Fe} = 0.35-0.51 a break appears in the E(T) function at about 513°C, which confirms the eutectic decomposition of the γ-phase into α- and β-phase. Fig. 1 presents the phase diagram of the Fe - Te system according to S. Chiba (Ref. 3, see below). The denotations for the phases are taken from S. Chiba. The authors' results are dash-lined. There are 2 figures, 2 tables, and 7 references: 4 Soviet-bloc and 3 non-Soviet-bloc. The 2 references to English-language publications read as follows: S. Chiba, J. Phys. Soc., Japan, 10, 837, (1955); M. Hansen, K. Anderko, Constitution of

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B101/B201

Thermodynamic properties of alloys ...

Binary Alloys, 1958

SUBMITTED: January 10, 1961

Fig. 1. Constitution diagram of the Fe - Te system.
Legend: Continuous lines: data by S. Chiba; dashed lines: authors' data.

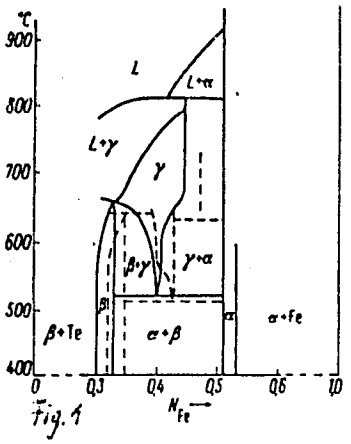

Fig. 1

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S/020/61/139/003/018/025
B103/B208

AUTHORS: Otopkov, P. P., Gerasimov, Ya. I., Corresponding Member AS USSR, and Yevseyev, A. M.

TITLE: Study of thermodynamic properties of cerium-lead, praseodymium-lead, and neodymium-lead alloys

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 139, no. 3, 1961, 616-617

TEXT: The authors determined the activity of lead in its alloys with cerium, praseodymium, and neodymium. They applied the method of measuring the pressure of the saturated vapor. They studied alloys with lead concentrations that corresponded to heterogeneous ranges from 0.97 to 0.75, from 0.75 to 0.50, from 0.50 to 0.33, and from 0.33 to ~0.005 atomic portions of lead. 3-4 alloys were examined in each range. The authors note that the phase diagrams for the systems Ce-Pb and Pr-Pb have so far not been determined with sufficient precision, while the diagram for the system Nd-Pb is not available at all (Ref. 1: M. Hansen, K. Anderko, Constitution of Binary Alloys, N. Y., 1958). The authors assume that all three diagrams belong to the same type as the phase

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Study of thermodynamic properties

diagram for the system La - Pb in which the following compounds were detected: $LaPb_3$, LaPb, and La_2Pb. Device and methods used had been earlier described (Ref. 2: G F Voronin, A M Yevseyev, ZhFKh, 33, 2245 (1959)). The alloys were produced from 99.9 % pure rare earths and from spectrally pure lead. The method used permits a determination of the activity a_i of one of the alloy components and the variation of the chemical potential during the formation of the alloy according to the formula: $\Delta\mu_i = RT \ln a_i$. The evaporation rate of lead from the alloys (which is proportional to the vapor pressure) was measured between 700 and 900°C; a_i for lead was calculated for 720-800°C (Table 1). According to known formulas the authors further determined the partial enthalpies and entropies of alloy formation, and the integral enthalpies and entropies of the alloy formation by graphical integration of the Dyugem-Margules equation. The latter enthalpies of all three systems were found to be only slightly different. It is concluded therefrom that the interactions of the three rare earths studied with lead belong to the same type. The negative sign of the entropies of alloy formation is related to the sign of the formation enthalpies, i.e., to a strengthening of interatomic bonds

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Study of thermodynamic properties...

in the alloys. The error in the determination of a_i of lead was 1 %, that in the calculation of the enthalpy of alloy formation, 20 %, and of the entropy, 25 %. The authors' opinion is that their results confirmed the existence of 3 intermetallic compounds in the system Nd—Pb, of one compound CePb, and of a heterogeneous range which correspond with the phase diagram in the system La—Pb. There are 1 figure, 3 tables, and 2 references: 1 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication is given in the body of the abstract.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: March 20, 1961

VECHER, A.A.; GERASIMOV, Ya.I.

Thermodynamic properties of Ag - Sb melts. Dokl. AN SSSR 139 no.4:863-865 Ag '61. (MIRA 14:7)

1. Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova.
2. Chlen-korrespondent AN SSSR (for Gerasimov).
(Silver-antimony alloys)

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B103/B101

15 2630

AUTHORS: Kuznetsov, F. A., Belyy, V. I., Rezukhina, T. N., and Gerasimov, Ya. I., Corresponding Member AS USSR

TITLE: Thermodynamical properties of cerium oxides

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 139, no. 6, 1961, 1405-1408

TEXT: The authors determined thermodynamical data on cerium which, together with data from publications, provide a complete thermodynamical characterization of the system Ce-O_2. In previous papers (Ref. 4: ZhFKh, 34, 2467 (1960); Ref. 5: ibid. 35, No. 5 (1961); Ref. 6: ibid. 34, No. 9 (1960)), they measured the high-temperature specific heat of CeO_2 and Ce_2O_3, and obtained the value $\Delta H^{\circ}_{298} = -85.43$ kcal. The present paper deals with the thermodynamical properties of cerium oxides in the CeO_2-$CeO_{1.5}$ range of compositions. They used the emf method with a solid electrolyte (Ref. 7, see below). In addition, the authors measured the equilibrium constants of cerium oxides with hydrogen. They used a more convenient

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Thermodynamical properties of...

modification of the apparatus described in Ref. 7 (Ref. 8: T. N. Rezukhina et al., ZhFKh, 35, No. 6 (1961)) for measuring the emf, namely, the cell

CeO_x ($2 > x > 1.5$)	solid electrolyte	Fe + wüstite

(1).

Mixed crystals of the system ThO_2-La_2O_3 with a purely ionic conductivity served as electrolytes. The CeO_x electrodes were pressed out of a mixture of corresponding amounts of CeO_2 and Ce_2O_3 at a pressure of 10 t/cm^2. The oxygen content of the preparation was determined by measuring the emf by the method of "active oxygen". CeO_x was handled in an argon atmosphere. The values of the equilibrium emf of cell correspond to the change of the isobaric potential ($\Delta\bar{G}^o_I = -2FE$) of the reaction releasing the current: $(1/\delta)CeO_x + Fe_{0.947}O \longrightarrow (1/\delta)CeO_{x+\delta} + 0.947\,Fe$ (I). A combination of $\Delta\bar{G}^o_I$ with $\bar{G}^o_{II}$ of the wüstite formation from the elements:

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Thermodynamical properties of...

$0.947\ Fe + 0.5\ O_2 \longrightarrow Fe_{0.947}O$ (II), for which $\Delta G_{II} = -63{,}570 + 16.06\ T$ (1073 - 1270°K) according to Ref. 10 (see below) and H. Peters, H. H. Möbius (Ref. 11: Zs. phys. Chem., 209, 298 (1958)), makes it possible to calculate the reaction $(\Delta\bar{G}^{\circ}_{III})$: $(1/\delta)CeO_x + 1/2\ O_2 \longrightarrow (1/\delta)CeO_{x+\delta}$ (III). It was found that E varies linearly with temperature for each composition of CeO_x over the entire range of temperatures: $E = a + bT$. The equilibrium constants $K_{eq} = p_{H_2O}/p_{H_2}$ of the reduction of CeO_x by hydrogen: $(1/\delta)CeO_{x+\delta} + H_2 \longrightarrow (1/\delta)CeO_x + H_2O$ (IV) were measured in a device described by the authors in ZhFKh, 25, 93 (1951). Since the intermediate cerium oxides are pyrophoric, only the constants of CeO_2 or Ce_2O_3 were measured. By a combination of $\Delta\bar{G}^{\circ}_{IV} = -RT \ln K_{eq}$ with ΔG°_{V} of the reaction of water-vapor formation: $(\Delta G^{\circ}_{V} = -59{,}000 + 13.38\ T)$ it is also possible to calculate ΔG°_{III}. The authors' results agree well with those obtained by

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G. Brauer et al. (Ref. 14, see below). The thermodynamical values describing the reaction $Ce_2O_3 + 1/2\ O_2 \rightarrow 2CeO_2$ (VI) were obtained by graphical integration of the $\Delta\bar{G}^o_{III}$ isotherms for the composition of CeO_x between $1.5 < x < 2$ for 973, 1073, 1173, and 1273°K. On the basis of these data and of the value $(\Delta H_{298})_{VI} = -85.43$ kcal, and considering the temperature dependence of the specific heat of CeO_2 and Ce_2O_3, the following equation was derived for the range 298-1273°K:
$\Delta G^c_{VI} = -85,500 - 4.007 \log T + 1.495 \cdot 10^{-3} T^2 - 0.47 \cdot 10^5/T + 35.8\ T$. After determining $(\Delta S^o_{298})_{VI}$ and assuming $S^o_{298} = 16.64$ entropy units for cerium (Ref. 1, see below) and $S^o_{298} = 14.89$ entropy units for CeO_2, the authors obtain $(S^o_{298})_{Ce_2O_3} = 30.8$ entropy units. On the strength of this value and of other data presented above, all thermodynamical values of the reaction $2\ Ce + 3/2\ O_2 \rightarrow Ce_2O_3$ (VII) can easily be calculated. There are

Thermodynamical properties of...

1 figure, 5 tables, and 14 references: 5 Soviet and 9 non-Soviet. The four most important references to English-language publications read as follows: Ref. 1: D. H. Parkinson, F. E. Simon, F. H. Spedding, Proc. Roy. Soc., 207, 137 (1951); Ref. 7: K. Kiukkola, C. Wagner, J. Electrochem. Soc., 104, 379 (1957); Ref. 10: L. S. Danken, R. W. Garry, J. Am. Chem. Soc., 61, 1398 (1945); Ref. 14: G. Brauer , K. A. Gingirich, U. Holtschmidt, J. Inorg. and Nucl. Chem., 16, 77 (1960).

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: May 5, 1961

Card 5/5

3673
S/020/61/140/002/016/023
B130/B110

18.8100

AUTHORS: Geyderikh, V. A., and Gerasimov, Ya. I., Corresponding Member AS USSR

TITLE: Study of thermodynamic properties of cobalt antimonides by the emf method

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 140, no. 2, 1961, 391-393

TEXT: The thermodynamic integral values of the cobalt antimonides $CoSb_3$, $CoSb_2$, and CoSb were determined by measuring the emf. The method was described by the authors (DAN, 130, 1074 (1960); ZhFKh, 34, 2789 (1960)). The compound $CoSb_2$ deviates from its stoichiometric composition. The upper limit of antimony lies in a homogeneous CoSb compound at 49.2 atom%. The experimental values hold for this composition. Antimony with a purity of 99.999%, and cobalt prepared from chemically pure, nickel-free $Co(NO_3)_2$ were used to produce the alloys. The reaction $Co + 3Sb = CoSb_3$ (1) represents a process of the electrochemical element (-) $Co\,|\,CoCl_{2\,melt} + KCl + LiCl\,|\,CoSb_3 + Sb$ (+) (solid, heterogeneous melt). The change of the

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Study of thermodynamic ...

isobaric-isothermal potential in reaction (1) is expressed by the emf of element (I). $\Delta G_1 = -zFE_I$ (A), where z is the charge of Co^{2+}, F is the Faraday number, and E_I is the emf of element (I). For studies in the temperature range 790-890°K, the experimental data are described by the following equation: $E_I = (302.2 + 1.45 \cdot 10^{-3}T)$mv $\pm$ 9.6 mv. Then, $\Delta G_1 = (-13.94 - 0.067 \cdot 10^{-3}T)$kcal/mole of $CoSb_3$. The reaction $Co + 2CoSb_3 = 3CoSb_2$ (2) is equal to the process of the element

$$(-)Co\left|CoCl_{2\,melt} + KCl + LiCl\right|\underset{solid,\ heterogeneous\ melt}{CoSb_2 + CoSb_3}\ (+)\quad (II).$$

For the temperature range 800-990°K, $E_{II} = (136.3 + 30.4 \cdot 10^{-3}T)$mv $\pm$ 15.0 mv. According to Eq. (A), $\Delta G_2 = (-6.29 - 1.40 \cdot 10^{-3}T)$kcal/g-atom of Co. The formation of $CoSb_2$ from the elements $Co + 2Sb = CoSb_2$ may be regarded as a combination of reactions (1) and (2).

$$\Delta G_3 = \frac{2\Delta G_1 + \Delta G_2}{3} = (-11.39 - 0.51 \cdot 10^{-3}T)\text{kcal/mole of } CoSb_2.$$ The equa-

Study of thermodynamic ...

tion Co + $2CoSb_2$ = 2CoSb (4) is equal to the process of the element (-)Co|$CoCl_2$ + KCl + LiCl (melt)|CoSb + $CoSb_2$ (solid, heterogeneous melt) (+) (III). For the temperature range 770-800°K, E_{III} = (98.8 + $35.5 \cdot 10^{-3}$T)mv ± 4.2 mv; ΔG_4 = (-4.56 - $1.55 \cdot 10^{-3}$T)kcal/g-atom of Co. The formation of CoSb from the elements Co + Sb = CoSb (5) may be regarded as a combination of reactions (3) and (4); then, $\Delta G_5 = \frac{\Delta G_3 + \Delta G_4}{2}$ = (-7.98 - $1.03 \cdot 10^{-3}$T)kcal/mole of CoSb. The enthalpies and entropies were calculated from the equations for ΔG_1, ΔG_3, ΔG_5 on the basis of the relations $\Delta S = -\left(\frac{\partial \Delta G}{\partial T}\right)_p$ and $\Delta H = \Delta G + T\Delta S$. The changes of the thermodynamic functions are given in Table 1. A paper by N. V. Ageyev, Ye. S. Makarov (Izv. AN SSSR, OKhN, 1943, 87) is mentioned. There are 1 table and 10 references: 5 Soviet and 5 non-Soviet. The three references to English-language publications read as follows: T. Rosenqvist,

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30034
S/020/61/141/001/019/021
B119/B108

54800 also 1555

AUTHORS: Otopkov, P. P., Gerasimov, Ya. I., Corresponding Member AS USSR, and Yevseyev, A. M.

TITLE: Examination of the thermodynamical properties of platinum-lead alloys

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 141, no. 1, 1961, 154-156

TEXT: The authors determined the activity of Pb in Pt-Pb alloys of different compositions by measuring the Pb vapor pressure (Knudsen's effusion method). Method and equipment are described in a previous paper (G. F. Voronin, A. M. Yevseyev, ZhFKh, 33, 2245 (1959)). The object of this work was to compute ΔH and ΔS of these alloys. The atomic concentration N_{Pb} of Pb in the alloys was varied from 0.921 to 0.113. The evaporation rate of Pb which was proportional to vapor pressure, was measured in the temperature range of 700-875°C. From the data obtained the activities of Pb were computed in the temperature range of 700-790°C. At N = 0.921, the activity a_i of Pb is 0.891 both at 700 and 790°C. At N_{Pb} = 0.113,

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Examination of the thermodynamical ...

a_i is 0.006 at 700°C, and 0.016 at 790°C. In addition, the partial formation enthalpies and entropies of the alloys in question were determined, and the integrals of these quantities were found by graphical integration. The error limit is ~1% in the determination of the activity of Pb, ~20% in the determination of the enthalpy, and ~25% in the determination of the entropy. The thermodynamic functions for the Pb-Pt systems in question are listed in Table 2. There are 2 figures, 2 tables, and 2 references: 1 Soviet and 1 non-Soviet. The reference to the English-language publication reads as follows: M. Hansen, K. Anderko, Constitution of Binary Alloys, no. 4, 1958.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: June 21, 1961

Card 2/

VECHER, A.A.; GERASIMOV, Ya.I.

Thermodynamic properties of Ag - Bi melts. Dokl. AN SSSR 141 no.2:381-383 N '61. (MIRA 14:11)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova.
2. Chlen-korrespondent AN SSSR (for Gerasimov).
(Silver-bismuth alloys) (Electromotive force)

S/076/62/036/003/011/011
B119/B108

AUTHORS: Gerasimov, Ya. I., and Komarova, T. A.

TITLE: Nikolay Aleksandrovich Figurovskiy (On his 60th birthday)

PERIODICAL: Zhurnal fizicheskoy khimii, v. 36, no. 3, 1962, 666 - 668

TEXT: N. A. Figurovskiy, Doctor of Chemical Sciences, Professor, completed his studies at the vtoraya kostromskaya sovetskaya shkola (Second Kostroma Soviet School) in 1919, and worked at the RKI until 1920. He has been a Communist since 1921. From 1920 to 1927, he served in the Red Army where he taught chemistry for the commanding staff of the RKKA in Kostroma in 1922, and in Ivanovo-Voznesensk in 1923. He studied at Nizhegorod University in 1925, taught chemistry at the schools of higher education in Nizhniy-Novgorod (now Gor'kiy) from 1926, and co-directed the Chemical Division of the mentioned University. In 1934, he defended in Gor'kiy his candidate's dissertation "Kapillyarnyye svoystva aktivnykh ugley" ("Capillary properties of activated carbon"), and in 1940 his doctor's dissertation " "Sedimentometricheskiy analiz i yego primeneniye" ("Sedimentation analysis and its application") at the Kolloidno-elektrokhimicheskiy institut AN SSSR (Colloid-electrochemical Institute AS USSR)

Nikolay Aleksandrovich Figurovskiy...

in Moscow. He volunteered at the front in 1941, became a reservist in 1944, and worked in the group of the Upolnomochennyy Goskomitet Oborony (Authorized State Committee on Defense). In 1945 - 47, he headed the Glavnoye upravleniye universitetov (Main Administration of Universities), then became Deputy Director at the Institut istorii yestestvoznaniya AN SSSR (Institute of History of Natural Sciences AS USSR) and, after reorganization, at the Institut istorii yestestvoznaniye i tekhniki (Institute of History of Natural Sciences and Technology), in 1956 he became Director of this Institute. From 1945, he was a professor at the Chemical Division of the Moskovskiy gosudarstvennyy universitet (Moscow State University), and a consultant to the Tsentral'nyy nauchno-issledovatel'skiy aptechnyy institut (Central Pharmaceutical Scientific Research Institute). Two thirds of his papers deal with the history of natural sciences, especially of chemistry (papers on M. V. Lomonosov, T. Ye. Lovits, D. I. Mendeleyev, N. D. Zelinskiy, N. N. Zinin, A. P. Borodin, A. I. Khodnev, L. N. Shishkov, G. I. Gess, P. P. Orlov, A. A. Voskresenskiy, and others). His physicochemical papers deal with (1) the development of dispersion analysis and the extension of its field of application, (2) the crystallization and formation of new phases, and (3) the application of physicochemical analysis. He is an active co-worker of the Commission of

Card 2/3

Nikolay Aleksandrovich Figurovskiy...

the AS USSR, and a number of international commissions for the organization of scientific conferences. He is chairman of the metodicheskiy sovet po khimii Vsesoyuznogo obshchestva po rasprostraneniyu nauchnykh i politicheskikh znaniy (Council of Chemical Methods of the All-Union Community for the Propagation of Scientific and Political Knowledge), and a member of the Presidium of this institution. He is a member of several foreign scientific institutions. N. A. Figurovskiy has been awarded several military decorations. There is 1 figure.

Card 3/3

5.4800

S/020/62/143/005/011/018
B145/B138

AUTHORS: Ksenofontova, R. F., Vasil'yeva, I. A., and Gerasimov, Ya. I., Corresponding Member AS USSR

TITLE: Thermodynamics of tungsten oxides of variable composition

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 5, 1962, 1105-1107

TEXT: The thermodynamic formation function of the WO_x oxides (x = 2.702 - 2.976) was determined by means of emf measurements. The method has been described previously (ZhFKh, 36, no. 1 (1962)). The emf of cells of the type Mo, WO_x/0.85 $ZrO_2$0.15 CaO (mole fraction)/Fe, $Fe_{0.947}O$,Mo was measured in the range 900 - 1100°K (Mo molybdenum- or platinum shunts). The ZrO_2 - CaO electrolyte is a pure anion conductor between 600 - 1100°. The temperature dependence of ΔG_{II} ($=\Delta\bar{G}_{O_2}$) of the reaction: $2/\delta\ WO_{x+\delta} = 2/\delta\ WO_x + O_2$ (II) was determined from the temperature dependence of the measured emf, using equation $\Delta G_{III} = -63570 - 16.06T$ for the reaction:

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Thermodynamics of tungsten...

$0.947\ Fe + 1/2\ O_2 = Fe_{0.947}O$ (III) (H. Peters, H. H. Möbius, Zs. phys. Chem., 209, no. 6, 298 (1958)). Iron oxide as well as tungsten oxides were obtained by reduction of iron sesquioxide and the high-temperature modification of WO_3. The temperature was controlled with an accuracy of $\pm 0.5^{\circ}$. The pressure was 10^{-4} to 10^{-5} mm Hg. Results are shown in Table 1. The course of the isotherms in the W/O - ($-\lg P_{O_2}$) diagram ($-\lg P_{O_2}$ was obtained from equation $\Delta\bar{G}_{O_2} = -RT\ln P_{O_2}$) shows that in the range x = 2.89 - 2.72, a two-phase range exists at 850 - 900°K, which diminishes with rising temperature finally passing into a singlephase range above 1000°K. Identical, nonstoichiometric phases exist in the ranges x = 2.97 - 2.89 and x = 2.75 - 2.70. Vacancy formation in the cation lattice owing to completion of the O - lattice is assumed to be the mechanism of O_2 absorption by the crystal lattice of the lower oxide. Below critical temperature ($\sim 1000^{\circ}$K), when the concentration of cation vacancies exceeds saturation, the crystal lattice forms two phases. Another possibility is that the oxygen of the

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gas phase oxidizes the W^{4+} to W^{6+}, with the development of intermediate oxygen ions. There are 1 table and 2 figures.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: December 9, 1961

Legend to Table 1: (1) mv, (2) cal/mole.

x	$E = a + bT \pm 0{,}5-1$, (1)	$\Delta\bar{G}_{O_2} = a + bT$, кал/моль (2)
2,702	$-11{,}88+0{,}0577\ T$	$128\,236-37{,}44\ T$
2,719*	$6{,}68-0{,}045\ T$	$126\,520-36{,}27\ T$
2,750	$+33{,}20+0{,}0286\ T$	$124\,080-34{,}76\ T$
2,877	$-102{,}80+0{,}2025\ T$	$136\,630-50{,}80\ T$
2,905	$-0{,}66+0{,}1100\ T$	$127\,200-42{,}27\ T$
2,915	$-25{,}63+0{,}1550\ T$	$129\,510-45{,}42\ T$
2,920	$+86{,}76+0{,}935\ T$	$119\,140-40{,}75\ T$
2,945	$+58{,}12+0{,}1579\ T$	$121\,780-46{,}69\ T$
2,950	$+15{,}01+0{,}1698\ T$	$125\,760-47{,}79\ T$
2,976	$-332{,}18+0{,}6389\ T$	$157\,790-91{,}07\ T$

Card 3/3

S/081/62/000/012/008/063
B168/B101

5.4700

AUTHORS: Gerasimov, Ya. I., Nikol'skaya, A. V.

TITLE: Thermodynamic properties of tellurides of bismuth (Bi_2Te_3) and antimony (Sb_2Te_3)

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 12, 1962, 50, abstract 12B349 (Sb. "Vopr. metallurgii i fiz. poluprovodnikov", M., AN SSSR, 1961, 30 - 33)

TEXT: The emf's of a galvanic cell M (Sb, Bi)/(KCl + LiCl) fusion + $BiCl_3$, $SbCl_3$/(M_2Te_3 + Te)$^+$ were measured within the temperature range 370 - 420°C. The isobaric potentials at 400°C, enthalpies and entropies of formation for Bi_2Te_3 (Bi (liq.), Te (sd.)) were found by calculation to be

ΔZ = -3.76 ± 0.1 kcal/g-atom, ΔH = -4.88 ± 0.2 kcal/g-atom,
ΔS = -1.67 cal/g-atom·deg, Sb_2Te_3 (Sb (sd.), Te (sd.))

ΔZ = -2.95 ± 0.1 kcal/g-atom, ΔH = -2.86 ± 0.5 kcal/g-atom,
ΔS = +0.14 cal/g-atom·deg. There is a large error in the value given for

S/081/62/000/012/008/063
B168/B101

Thermodynamic properties of...

the entropy of formation of Sb_2Te_3 owing to the low temperature coefficient of the emf. [Abstracter's note: Complete translation.]

Card 2/2

SHAPOVALOVA, R.D.; BELOVA, V.I.; ZALESSKIY, A.V.; GERASIMOV, Ya.I.
(Moscow)

Some physical properties of tungstates. Part 3: Magnetic properties of tungstates. Zhur.fiz.khim. 35 no.12:2713-2716 D '61. (MIRA 14:12)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova.
(Tungstates--Magnetic properties)

GERASIMOV, YA. I.

STRUCTURE AND PHYSICAL PROPERTIES OF MATTER IN A LIQUID STATE
reports read at the 4th Conference convened in KIYEV from 1 to 5 June 1959, published by the publishein. House of KIYEV University, KIYEV, USSR, 1962

S/843/62/000/000/009/010
D207/D308

AUTHORS: Gerasimov, Ya.I., Nikol'skaya, A.V. and Yevseyev, ...I.

TITLE: Thermodynamic properties of liquid metal alloys

SOURCE: Stroyeniye i fizicheskiye svoystva veshchestva v zhidkom sostoyanii; materialy IV soveshch. po probl. zhidkogo sost. veshchestva, v Kiyeve 1959 g. Kiev, Izd-vo Kiev. univ., 1962, 115-118

TEXT: Knowledge of the thermodynamic properties of metal solutions is very valuable in the general theory of solutions. The present paper reports a study of the thermodynamic properties of the liquid alloys of copper with cadmium, antimony or bismuth, of bismuth with cadmium, and of lead with tin. The copper and bismuth alloys were investigated by the emf method, the lead-tin alloys were studied using the pressure of lead vapor measured by the effusion method. The work was carried out at 400-900°C. The experimental results were used to calculate the activity coefficients of the com-

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Thermodynamic properties ...

ponents, the enthalpy, and the change of the entropy of mixing, all as a function of temperature and composition. Brief discussions of the results of each of the alloy systems are followed by the general conclusion that the thermodynamic properties can be used to obtain qualitative information on the atomic structure of the alloys using the relationship between the composition dependences of the thermodynamic functions in solid and liquid states. Eutectic liquid alloy systems had microinhomogeneous structure, i.e. they had a short-range order of 'layered' type. In other alloys the short-range order varied continuously with composition and the presence of microinhomogeneities was less noticeable. There are 5 figures.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

S/191/62/000/012/002/015
B101/B186

AUTHORS: Anikin, A. G., Gerasimov, Ya. I., Dugacheva, G. M., Presnyakova, V. M.

TITLE: Purification of organic monomers by zone refining

PERIODICAL: Plasticheskiye massy, no. 12, 1962, 13-17

TEXT: A general survey is given on the theoretical principles of zone refining, based predominantly on non-Soviet papers. The applicability of this refining method to low-melting organic substances is discussed and the practical results are given that were obtained in the zone melting of methyl methacrylate and styrene. Zone refining was performed in an 80 mm tin plate trough immersed in liquid nitrogen. The sample was heated with a 0.5 mm nichrome coil (amperage 4 a), the molten zone being 8-9 mm wide and the rate of zone travel 1 cm/min. The initial degree of purity of methyl methacrylate of 99.2 mole-% was improved to 99.86 mole-% by remelting it 5 times and to 99.95 mole-% by remelting it 10 times. In styrene, the initial degree of purity of 98.85 mole-% improved to 99.7 mole-% when it was remelted 5 times. Working at low

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temperatures requires the careful exclusion of atmospheric moisture. There are 5 figures and 2 tables. The most important English-language references are: J. H. Beynon, R. A. Saunders, Brit. J. Appl. Phys., 11, 128 (1960); John S. Ball, R. V. Helm, C. R. Ferrin, Petr. Engr., 30, no. 13, C-36 (1958).

S/020/62/147/004/016/027
B107/B186

AUTHORS: Gerasimov, Ya. I., Corresponding Member AS USSR,
Abbasov, A. S., Nikol'skaya, A. V.

TITLE: Thermodynamic properties of indium tellurides

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 147, no. 4, 1962, 835-838

TEXT: The thermodynamic properties of In_2Te_5, In_2Te_3, InTe, and In_2Te were determined between 380 and 425°C from the e.m.f. of concentration chains. A eutectic LiCl - KCl mixture was used as electrolyte. The In_2Te_5 - Te chain was studied between 300 and 420°C, and a mixture containing 18, 12, and 70% by weight of KCl, NaCl, and $ZnCl_2$, respectively, was used as electrolyte. The studies were conducted in an argon atmosphere or in vacuo. The results may be expressed by $E = A + B \cdot T$. $E = 0.3350 + 0.176 \cdot 10^{-3}$ T for In_2Te_5 - Te; $E = 0.2327 + 0.102 \cdot 10^{-3}$ T ± 0.008 for In_2Te_5 - In_2Te_3; $E = 0.1182 + 0.248 \cdot 10^{-3}$ T ± 0.007 for

Thermodynamic properties of ... S/020/62/147/004/016/027
B107/B186

In_2Te_3 - InTe; E = 0.2550 - $0.300 \cdot 10^{-3}$ T ± 0.004 for InTe - In_2Te. Hence the thermodynamic data in Table 2 are calculated. Furthermore, the lattice constants of indium tellurides were determined from powder patterns taken with an РКД-57 (RKD-57) camera and copper radiation. For In_2Te_5, a focussing Guinier camera with a single-crystal monochromator was used. Results obtained agree well with those known in literature (cf. K. Schubert et al., Naturwiss. 41, 448 (1954)). There are 3 figures and 2 tables.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: July 13, 1962

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S/020/62/147/004/016/027
B107/B186

Thermodynamic properties of ...

Table 2. Thermodynamic data for indium tellurides. Legend: (1) phase; (2) - $\Delta G_{673^\circ K}$, in kcal; (3) $-\Delta H$, in kcal; (4) ΔS, entropy units (for 1 mole); (5) - $\Delta G_{673^\circ K}$, in kcal, ΔH, in kcal; (6) ΔS, entropy units (for 1 atom).

(1)	(2)	(3)	(4)	(5)	(6)
In_4Te_5	20,8±0,5	15,4±3,0	+8,0±2,0	3,0	2,2	+1,1
In_2Te_3	18,0±0,3	13,5±3,2	+6,7±2,0	3,6	2,7	+1,3
InTe	8,2±0,2	5,4±1,8	+4,0±1,0	4,1	2,7	+2,0
In_2Te	9,4±0,3	11,3±2,0	−3,0±1,5	3,1	3,8	−1,0

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ANIKIN, Aleksey Gerasimovich; DUGACHEVA, Galina Mikhaylovna; GERASIMOV, Ya.I., prof., otv. red.; PLATE, A.F., prof., otv. red.; KOROBTSOVA, N.A., red.; YERMAKOV, M.S., tekhn. red.

[Determination of the purity of organic substances] Opredelenie chistoty organicheskikh veshchestv. Otv. red. IA.I. Gerasimov, A.F.Plate. Moskva, Izd-vo Mosk. univ. 1963. 147 p. (MIRA 16:10)

1. Chlen-korrespondent AN SSSR (for Gerasimov).
(Organic compounds) (Chemistry, Analytical)

GERASIMOV, Yakov Ivanovich; KRESTOVNIKOV, Aleksandr Nikolayevich; SHAKHOV, Aleksey Sergeyevich; Prinimali uchastiye: LOMOV, A.L., assistent; LAVRENT'YEV, V.I., aspirant; KAMAYEVA, O.M., red. izd-va; MIKHAYLOVA, V.V., tekhn. red.

[Chemical thermodynamics in nonferrous metallurgy]Khimicheskaia termodinamika v tsvetnoi metallurgii; spravochnoe rukovodstvo. Moskva, Metallurgizdat. Vol.3.[Thermodynamics of tungsten, molybdenum, titanium zirconium, niobium, tantalum and their most important compounds]Termodinamika vol'frama, molibdena, titana, tsirkoniia, niobiia, tantala i ikh vazhneishikh soedinenii. 1963. 283 p. (MIRA 16:2)
(Nonferrous metals--Thermodynamic properties)

Thermodynamic properties of indium arsenide. A. A. Abbasov, A. V. Nikol'skaya, V. P. Vasil'yev, Ya. I. Gerasimov.

Thermodynamic properties of gallium arsenide. A. A. Abbasov, A. V. Nikol'skaya, V. P. Vasil'yev, Ya. I. Gerasimov.

Thermodynamic investigation of the system gallium-tellurium. A. A. Abbasov, A. V. Nikol'skaya, V. P. Vasil'yev, Ya. I. Gerasimov.

Thermodynamic properties of aluminum antimonide. V. A. Geyderikh, A. A. Vecher, Ya. I. Gerasimov.
(Presented by A. V. Nikol'skaya--20 minutes).

Report presented at the 3rd National Conference on Semiconductor Compounds, Kishinev, 16-21 Sept 1963

GERASIMOV, Yakov Ivanovich, prof.; DREVING, Vladimir Petrovich; YEREMIN, Yevgeniy Nikolayevich; KISELEV, Andrey Vladimirovich; LEBEDEV, Vladimir Petrovich; PANCHENKOV, Georgiy Mitrofanovich; SHLYGIN, Aleksandr Ivanovich; NIKOL'SKIY, B.P., prof., retsenzent; SHUSHUNOV, V.A., prof., retsenzent; LUR'YE, G.Ye., red.; SHPAK, Ye.G., tekhn. red.

[Course in physical chemistry] Kurs fizicheskoi khimii. [By] IA.I.Gerasimov i dr. Moskva, Goskhimizdat, 1963. Vol.1. 624 p. (MIRA 17:1)

1. Chlen-korrespondent AN SSSR (for Gerasimov, Nikol'skiy).
2. Kafedra phizicheskoy khimii Leningradskogo gosudarstvennogo universiteta (for Nikol'skiy, Shushunov).

GERASIMOV, Ya.I.

Chemical form of the movement of matter, its connection with other forms of motion. Vest.Mosk.un. Ser.2:Khim. 18 no.6:3-10 N-D '63. (MIRA 17:4)

1. Kafedra fizicheskoy khimii Moskovskogo universiteta.

FRUMKIN, A.N.; GERASIMOV, Ya.I.; CHMUTOV, K.V.; TEMKIN, M.I.; ZEUKHOVITSKIY, A.A.; TURKEL'TAUB, N.M.

Kirill Alekseevich Gol'bert. Zhur.fiz.khim. 37 no.1:249 Ja '63. (MIRA 17:3)

VECHER, A. A.; GERASIMOV, Ya. I.

Study of the thermodynamic properties of binary metallic systems by the electromotive force method. Part 8. Zhur. fiz. khim. 37 no. 3:490-498 Mr '63. (MIRA 17:5)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.

L 16959-63 EWP(q)/EWT(m)/BDS AFFTC Pad JD/HW
S/076/63/037/004/001/029

AUTHOR: Vechan, A. A., Gerasimov, Ya. I. 60

TITLE: Investigation of the thermodynamic properties of binary metallic systems by the EMF method. IX. Solid copper-palladium solutions

PERIODICAL: Zhurnal fizicheskoy khimii, V. 37, No. 4, 1963, 739-745

TEXT: The thermodynamic properties of non-ordered solid copper-palladium solutions are investigated at 1,000 degrees K by the EMF method. The thermodynamic properties of alloys of copper and palladium agree with the presence of superstructures in these alloys at lower temperatures. The thermodynamic properties of these alloys are discussed in terms of Guggenheim's quasichemical theory, and an attempt is made to compare the electron exchange between the components of copper-palladium and copper-platinum alloys. There are 5 tables and 4 figures.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet imeni M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov). Otdel fiziki tverdogo tela i poluprovodnikov AN BSSR (Department of Solid State Physics and the Physics of Semiconductors, Academy of Sciences Belorussian SSR).

SUBMITTED: September 1, 1963

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GERASIMOV, Ya.I. (Moskva, V-296, Lomonosovskiy prospekt, 14, kv. 499)

From the Scientific Advisory Board on chemical thermodynamics at the Institute of General and Inorganic Chemistry of the Academy pf Sciences of the U.S.S.R. Zhur. fiz. khim. 37 no.9:2145 S '63. (MIRA 16:12)

1. Predsedatel' Nauchnogo Soveta po khimicheskoy termodinamike pri Institute obshchey i neorganicheskoy khimii AN SSSR.

GEYDERIKH, V.A.; GERASIMOV, Ya.I.

Heats of atomization of transition metal compounds of the iron group. Zhur.fiz.khim. 37 no.10:2353-2355 O '63. (MIRA 17:2)

1. Moskovskiy gosudarstvennyy universitet.

SUNDARESEN, M.; GERASIMOV, Ya.I.; GEYDERIKH, V.A.; VASIL'YEVA, I.A.

Study of the thermodynamic properties of iron-platinum alloys by the method of electromotive forces. Zhur. fiz. khim. 37 no.11:2462-2466 N'63. (MIRA 17:2)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova.

BALANDIN, Aleksey Aleksandrovich, akademik; GERASIMOV, Ya.I., prof., retsenzent; PLATE, A.F., prof., retsenzent; AGRONOMOV, A.Ye., dots., red.

[Multiplet theory of catalysis] Mul'tipletnaia teoriia kataliza. Moskva, Izd-vo Mosk. univ. Pt.2. 1964. 242 p. (MIRA 18:2)

1. Zaveduyushchiy kafedroy fizicheskoy khimii Moskovskogo gosudarstvennogo universiteta chlen korrespondent AN SSSR (for Gerasimov). 2. Zaveduyushchiy kafedroy khimii nefti Moskovskogo gosudarstvennogo universiteta (for Plate).

GERASIMOV, Ya.I.

"Thermodynamic properties of individual substances." Reviewed by IA. I. Gerasimov. Vest. AN SSSR 34 no. 1:128-129 Ja '64. (MIRA 17:5)

1. Chlen-korrespondent AN SSSR.

ACCESSION NR: AP4035815 S/0020/64/156/001/0118/0120

AUTHOR: Abbasov, A. S.; Nikol'skaya, A. V.; Gerasimov, Ya. I. (Corresponding member); Vasil'yev, V. P.

TITLE: Determination of the thermodynamic properties of indium arsenide from the electromotive force measurements

SOURCE: AN SSSR. Doklady*, v. 156, no. 1, 1964, 118-120

TOPIC TAGS: electromotive force, indium arsenide, thermodynamic property, entropy, enthalpy, Gibbs free energy, thermodynamic function

ABSTRACT: Indium arsenide belongs to a group of compounds of the $A^{III}B^{V}$ type. This group of semiconductors is now the subject of extensive investigations. The purpose of this work was to study the basic thermodynamic properties of InAs. This investigation of thermodynamic properties of InAs was based on the measurement of emf of the following cell

(-)In(l)/chloride melt + InCl/(InAs As)(s)(+)

These investigations were carried out in the 240 - 510 C temperature interval. On the basis of a phase diagram of In-As it was concluded that electrodes of

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arsenic-arsenide type, regardless of the excess amount of As, are in the two-phase region. Thus, the emf of such cells corresponds to the formation of arsenide from the components, and may be represented as follows:

$$In(l) + As(S) = InAs(s) \qquad (I)$$

Directly from emf measurements the authors calculated the change of Gibbs free energy (ΔG^0) for reaction (I)

$$\Delta G = -nFE$$

where n is the charge on metal ion, (n=1 for In), F is the Faraday's constant equal to 23062 cal/v·g-gequiv., and E is the emf in volts. The change of entropy and enthalpy of this process was calculated from the measurements of emf as a function of temperature

$$\Delta S = -d(\Delta G)/dt = nF \frac{dE}{dt}$$

$$\Delta H = \Delta G + T\Delta S$$

"The authors express their gratitude to L. Ya. Krol' and M. D. Khlystovskaya of the Institute of Rare Elements (Institute redkikh elementov) for the preparation of the indium arsenide." Orig. art. has: 1 table and 1 figure.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova

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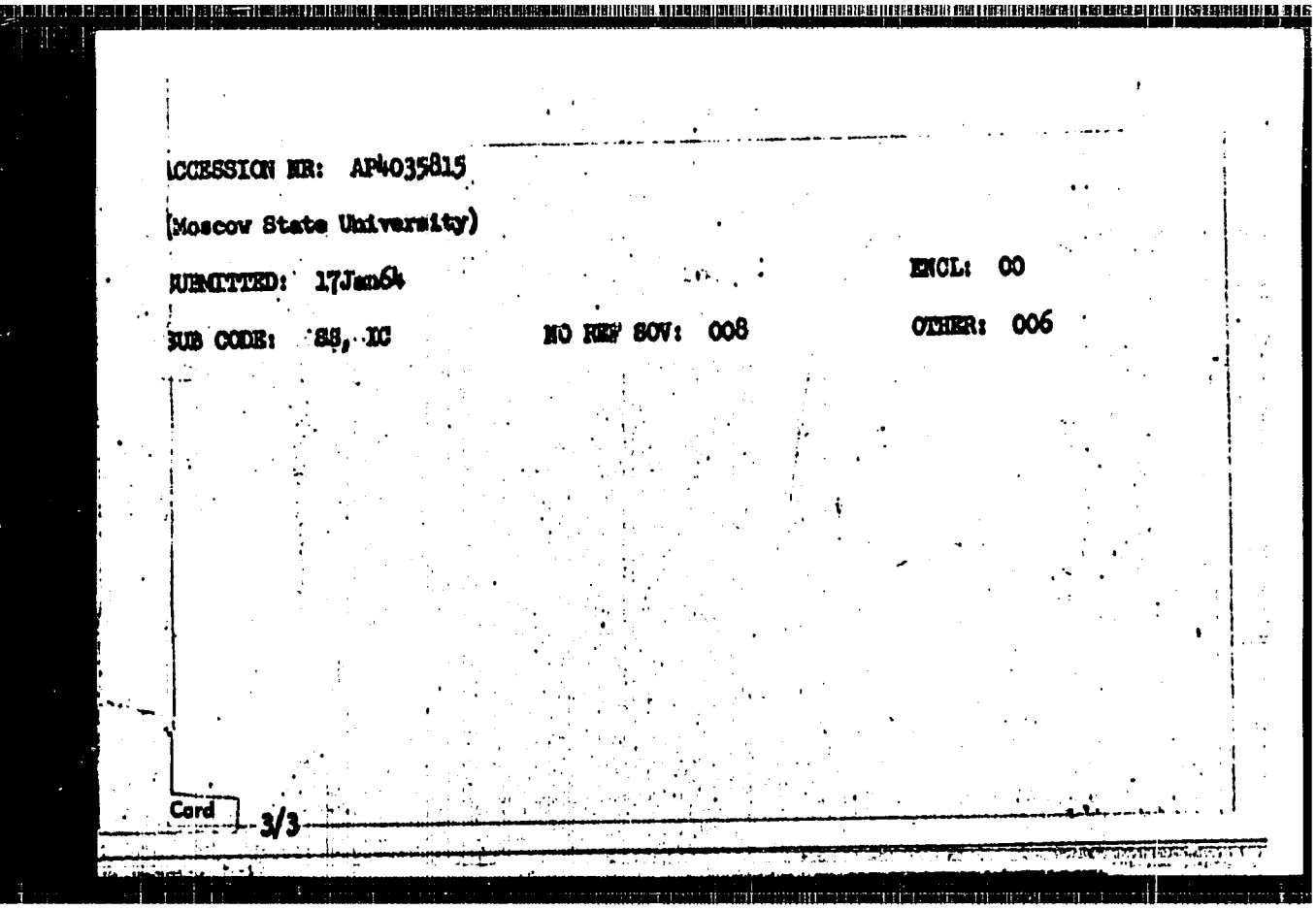

ACCESSION NR: AP4035815

(Moscow State University)

SUBMITTED: 17Jan64 ENCL: 00

SUB CODE: GS, IC NO REF SOV: 008 OTHER: 006

Card 3/3

ACCESSION NR: AP4040953 S/0020/64/156/005/1140/1142

AUTHOR: Abbasov, A. S.; Nikol'skaya, A. V.; Vasil'yev, V. P.; Gerasimov, Ya. I. (Corresponding member, AN SSSR)

TITLE: Analysis of the thermodynamic properties of gallium tellurides by electromotive force method

SOURCE: AN SSSR. Doklady*, v. 156, no. 5, 1964, 1140-1142

TOPIC TAGS: emf, gallium, gallium telluride, gallium telluride compound, Te, gallium mono-telluride, gallium sesquitelluride, semiconductor, gallium trichloride

ABSTRACT: The phase diagram of the system gallium-tellurium given in Khausen and and Anderko's nomograph (Struktura dvoyny*kh splavov, Moscow, 1962, page 806) points out the existence of compounds of Ga_2Te_3 and Ga Te compositions without homogeneity intervals. They also noted that the structure of a region rich in tellurium was not fully explained. They assumed that a telluride of the composition $Ga Te_3$ was formed in it. The purpose of the present paper was an anlaysis of the thermodynamic properties of gallium tellurides. The authors used the emf method in their analysis. The methodology of this method was described previously by A. V. Nikol'skaya et al (DAN, 130, No. 5, (1960, 1074) and by Ya. I. Gerasimov

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ACCESSION NR: AP4040953

and A. V. Nikol'skaya (Voprosy metallurgii i fiziki poluprovodnikov, Izd. AN SSSR, 1961, page 30). Concentration electrochemical chains of the type

$$(-)\ Ga_{liquid} \left| \begin{matrix} \text{liquid} \\ \text{electrolyte} + GaCl_3 \end{matrix} \right| (Ga_x Te_{1-x})\ \text{solid},\ (+)$$

where x is the gallium mole fraction, were studied. The phases were identified by X-ray analysis for the stoichiometric compositions as well as for transition alloys. The parameters which were found are in satisfactory agreement with those found in literature: a=5.89 angstrom for $Ga_2 Te_3$, a=23.79 angstrom for Ga Te, b=4.08 angstrom, c=10.49 angstrom, and β=45.7°. Alloys with compositions of 53.2 - 84.2 at .% of Te were analyzed. Findings showed that all alloys with compositions of 63.5 to 84.2 at .% of Te yielded a constant emf value within an experimental error of ± 11.0 millivolts. This indicates that the examined alloys lie in one and the same phase space. Alloys with 53.2 to 55.7 at .% of Te also yielded constant values, which corresponds to the formation of the Ga Te phase from $Ga_2 Te_3$ and gallium. Equations of the form E=A+BT were found for the relationship between emf and absolute temperature as the result of processing the experimental data by the least square method. The errors in the emf magnitudes and smoothing coefficients A and B, which determine the precision for calculation of temperatures and entropies, were calculated with equations of the least squares technique. Findings

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ACCESSION NR: AP4040953

are generalized in a table. Orig. art. has: 1 figure, 2 tables and 3 equations.

ASSOCIATION: Moskovskiy gosudarstvenny*y universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 22Feb64 ENCL: 00

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Card 3/3

ACCESSION NR: AP4041405 S/0020/64/156/006/1399/1401

AUTHOR: Abbasov, A. S.; Nikol'skaya, A. V. ; Vasil'yev, V. P. ; Gerasimov, Ya. I. (Corresponding member AN SSSR)

TITLE: Investigation of the thermodynamic properties of gallium antimonide by the electromotive force method

SOURCE: AN SSSR. Doklady*, v. 156, no. 6, 1964, 1399-1401

TOPIC TAGS: gallium antimonide, thermodynamic property, electromotive force, isobaric isothermal potential, entropy, enthalpy

ABSTRACT: The thermodynamic properties of GaSb were calculated from the e.m.f. of the cell $Ga_{liq} \mid (KCl\text{-}LiCl)_{melt} + GaCl_3 \mid (GaSb + Sb)_{solid}$ in the 360-560C temperature interval wherein the e.m.f. of the reaction of liquid Ga and solid Sb to form solid GaSb was measured (fig. 1). The isobaric-isothermal potential, entropy and enthalpy were calculated for the given temperature range and for standard temperature from E = 161.1 - 0.095T mv:
$-\Delta G = 3.2 \pm 0.3$, $-\Delta G^0 = 4.5 \pm 0.3$ kcal/gm.atom;
$-\Delta S = 3.3 \pm 0.7$, $-\Delta S^0 = 0.7 \pm 0.7$ electron ergs/gm. atom;
$-\Delta H = 5.6 \pm 0.5$, $-\Delta H^0 = 4.7 \pm 0.5$ kcal/gm.atom.

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ACCESSION NR: AP4041405

The thermodynamic functions for the formation of GaSb from monatomic gas molecules were also calculated; ΔH_{298} = 68.5 kcal/gm.atom; ΔS_{298} = 32.1 electron ergs/gm.atom; ΔG_{298} = 59.0 kcal/gm. atom.

Orig. art. has: 2 tables and 1 figure

ASSOCIATION: Moskovskiy gosudarstvenny*y universitet im. M.V. Lomonosova (Moscow State University)

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Card 2/3

ACCESSION NR: 4041405

ENCLOSURE: 01

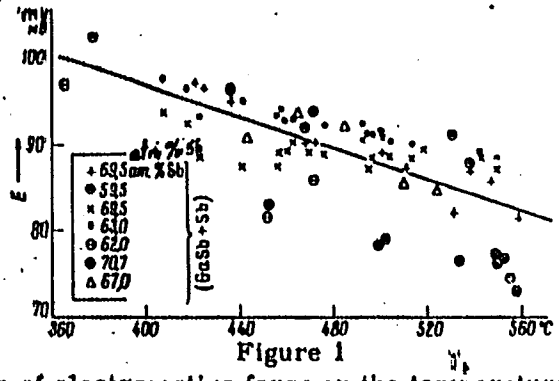

Figure 1

Dependence of electromotive force on the temperature in the cell

$Ga_{liq} | (KCl - LiCl)_{melt} + GaCl_3 | (GaSb + Sb)_{solid}$

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KARAPET'YANTS, Mikhail Khristoforovich; GERASIMOV, Ya.I., otv. red.; MEDVEDEV, V.A., red.

[Methods for the comparative calculation of physicochemical properties] Metody sravnitel'nogo rascheta fiziko-khimicheskikh svoistv. Moskva, Nauka, 1965. 401 p. (MIRA 18:4)

1. Chlen-korrespondent AN SSSR (for Gerasimov).

RZA-ZADE, P.F.; RUSTAMOV, P.G.; GEYDAROVA, E.A.

Interaction of second group metal metaborates. Azerb.khim.zhur. no.5:113-118 '61. (MIRA 15:5)
(Alkaline earth borates)

VECHER, R.A.; GERASIMOV, Ya.I., GEYDERIKH, V.A.

Iron activity in solid solutions of silicon in iron. Zhur. fiz. khim. 39 no.5:1229-1232 My '65. (MIRA 18:8)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova.

BAZAROV, I.P.; GERASIMOV, Ya.I.; KISELEV, A.V.; PREDVODITELEV, A.S.; RADUSHKEVICH, L.V.; SKURATOV, S.M.; TIRLITSKIY, N.P.; CHMUTOV, K.V.; SHUBNIKOV, A.V.; SHULEYKIN, V.V.

Vladimir Ksenofontovich Semenchenko, 1894- ; on his 70th birthday. Zhur. fiz. khim. 39 no.5:1300-1301 My '65. (MIRA 18:8)